How to give feedback during endoscopy training

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Introduction

Training fellows to perform endoscopy is challenging. Most trainers genuinely desire to be good teachers, but competing demands can be difficult to navigate. As we consider the hypothetical example below, think about what you might do differently:

A faculty member trains fellows in endoscopy at an academic medical center in the United States; our trainee is a fellow in his fifth month of training. During the week that they work together, the trainer notes that the trainee is doing pretty well with basic endoscopy, but it is a busy week in the unit. The nurses are short-staffed, several patients have large polyps, and a few are difficult to sedate. As a result, the trainer takes over during many procedures. The trainer tries to give the trainee a few pointers, but he doesn't seem to be listening. The trainer plans to give him feedback at the end of the week. However, Friday is a busy day. Before the trainee leaves, the trainer praises him for reaching cecum often; she marks "7" and writes "good job" as feedback on his evaluation form. The trainee is disappointed, because he does not seem to be making progress with polypectomy.

In 2016, 462 new fellows started training in gastroenterology.[1] Few had any endoscopy experience prior to fellowship, but most will regularly perform endoscopy after graduation. Although data are lacking, most trainers in the United States probably receive little to no instruction in how to teach fellows during the 250 minimum colonoscopies required for competence assessment[2]. Accurate assessment of a fellow's performance, and sharing that assessment through regular feedback, is essential to help fellows to reach their maximum potential. Feedback has been defined as "specific information about the comparison between a

trainee's observed performance and a standard, given with the intent to improve the trainee's performance."[3] Feedback can be helpful or detrimental depending on the quality, timing, quantity, content, valence and manner in which it is given. Furthermore, endoscopy requires multiple technical and non-technical skills that require different types of feedback. Trainers may feel most comfortable providing feedback on technical skills, yet the teaching of nontechnical skills is equally important.[4]

In this commentary, we aim to stimulate discussion of feedback among endoscopy teachers and to make practical suggestions for providing effective feedback to endoscopy learners. This commentary is not based on a systematic review of the literature, but rather on our experiences as endoscopy teachers and education researchers and scholars, and on insights from the ASGE's Train the Trainers course. We start by introducing a framework in which to consider feedback during clinical training: the 4-phased cycle proposed by van de Ridder.[5] We discuss this model as it applies to endoscopy training, introduce and describe learning theories relevant to feedback, and discuss how they can be applied to endoscopy training in terms of: (1) negotiating appropriate goals for each endoscopy session, (2) observing the trainee during the session, (3) providing feedback after the session, and (4) helping the trainee assimilate the feedback and set goals for the next session. By allowing these theories to inform our practice, we can maximize the educational potential of every endoscopy session.[6]

Phase 1 - Negotiate goals for the session

Long procedures can be a burden on the patient, the trainer, and the endoscopy unit. However, fellows need adequate time to engage in productive struggle to advance their skills, and a trainee

can feel like a failure if the supervisor takes over the procedure too quickly.[7] During endoscopy, the trainer's top priority must be the patient, ensuring a safe, high-quality, reasonably efficient procedure; fellow education is generally a close second priority. These two priorities must be balanced on a case-by-case basis, taking needs of the patient, the fellow, and the endoscopy unit into account.

A brief discussion regarding goals and roles prior to each procedure, or each endoscopy session, can help align trainer and trainee expectations. In this discussion, the trainer/trainee team should determine what portion of the procedure is likely to be performed by the trainee and under what circumstances the trainer is likely to take over.[6] Trainees should identify the skill/component on which they would like the most feedback. Two such examples are shown in Table 1. Shared understanding of needed feedback lets the trainer focus his attention on the most relevant portions of the exam.

Feedback frequency and timing should also be discussed, as trainees may retain skills better when they set the schedule.[8] For example, a trainee working on polypectomy might request feedback be given after each polypectomy, halfway through the day, or at the end of the day. This planning conversation should only take a minute or two, but may improve the quality of the training experience.

Phase 2 - Observe carefully but provide minimal feedback during the session

Beware of cognitive load

Understanding the concept of cognitive load can help trainers hone their feedback. Cognitive load theory proposes that short-term, or "working," memory, is the primary bottleneck for

learning. Working memory can manage only a few pieces of information at any given time.[9] When working memory becomes overloaded, learning and performance suffer.

Three different types of cognitive load impose strain on learners' working memory: intrinsic, extraneous and germane load.[9] Intrinsic load relates to essential components of a learning task, whereas extraneous load is imposed by non-essential tasks or distractions. Germane load owes to deliberate formation of learning "schemas" (Figure 1 and Table 2). Learning occurs when learners construct cognitive schemas that are stored in, and can be retrieved from, working memory. The goal of any learning encounter is to minimize extraneous load, and to adjust intrinsic load for the level of the learner, in order to maximize germane load and therefore learning. Cognitive load theory has been studied and shown relevant to colonoscopy learning.[10, 11]

Tailor feedback to cognitive load

Performing a complex motor skill while receiving, interpreting and responding to feedback can quickly overwhelm working memory. Endoscopy learners hear monitors beeping, feel scope tension, and see visual feedback on the screen, among other stimuli. It is therefore not surprising when a trainee does not immediately follow a trainer's instructions. To ensure that feedback is received, the trainer should use the command, "Stop." When all movements are halted, attention can be focused on receiving and processing feedback.[6] This feedback should be specific and brief, using standard terminology (Table 3), which reduces working memory resources needed to process instructions.[6]

Concurrent feedback (i.e., "feedback-in-action") refers to feedback given while a skill is performed. Small bits of concurrent feedback, timed appropriately, will not overload working memory. Too much concurrent feedback can be problematic. Frequent interruptions can detract from learning, as learners may shift attention away from (or "tune out") interruptions to focus on the task at hand.[12] When feedback distracts a trainee from seeing or feeling the natural consequence of his actions, learning opportunities are lost. Alternatively, concurrent feedback can become a "crutch." If a trainee constantly receives instructions, he will lose the opportunity to struggle to solve problems. [13] Such struggles help trainees develop learning schemas, which cannot happen while trainees are focused on trainers' feedback.

Phase 3 - Provide the bulk of the feedback after the session

Delayed feedback (i.e. "feedback-*on*-action" or "facilitated reflection") refers to feedback given after a skill is performed, similar to debriefing. The delay gives the trainee time to form his own opinion of how the procedure went, and to reflect on what he learned before hearing the trainer's perspective. Walsh studied medical students performing endoscopic tasks for the first time.[14] The students practiced sequences on a model, either with immediate or delayed feedback. The immediate feedback group learned the skill slightly faster, yet when a novel sequence was tested one week later, the delayed feedback group did significantly better. This suggests that immediate feedback might enable us to coach fellows through a procedure faster, but that performance on future procedures (i.e., learning) might be enhanced by delayed feedback.

The "Ask-Tell-Ask" strategy[15, 16] is one useful format for delayed feedback as follows:

1. Ask the trainee for a self-assessment: This is based on the goals negotiated at the beginning of the session, for example, “You were planning to focus on positioning polyps for polypectomy today. How do you think that went?”
2. Tell the trainee what you observed: The trainer’s observations either confirm or correct the trainee’s self-assessment. “I noticed you initially put the polyp in the right position, but the position was lost when the snare was placed through the biopsy channel.”
3. Ask the trainee what he plans to do to improve: “What do you think you can do to help get those polyps in the right position?”

After choosing the right opportunity to provide feedback, it is important to choose the right words.

Be constructive and specific

Negative feedback can be demotivating. An unsuccessful performance does not require negative feedback. Particularly after an endoscopic mishap, the trainee most likely recognizes that the performance was unsuccessful, rendering negative feedback redundant. A more constructive approach is to focus on the last thing that the trainee did correctly before the error occurred. For example, after a trainee has an unsuccessful attempt at hemostasis resulting in profuse bleeding, instead of saying, “You shouldn’t have ripped the clip off of the vessel before it was released by the technician,” the trainer might start by describing positive aspects of the performance. (“You located the source for bleeding and chose the right tool for hemostasis.”) Then constructive language can be used to pinpoint the problem. (“I think you confused this clip with another brand. Let me show you the differences between these three clips.”) Using positive feedback can enhance motivation instead of leading to shame.[17]

Vague feedback (whether positive or negative), or simple praise (which is not actually feedback), will not improve performance.[8] If a fellow struggling with the hepatic flexure is told, "You should be better at this by now," he will likely not look forward to his next attempt, and will not know what to do differently when that opportunity arises. Specific feedback, on the other hand, is helpful because it targets areas for improvement and is motivating. If the fellow struggling with the hepatic flexure is told, "You could try turning the patient's shoulders back to the bed while keeping his hips pointed forward," he will likely be motivated to try the change, and he will have confidence that his trainer has his best interest at heart.

Use facilitative feedback to develop problem-solving skills

Directive feedback involves giving a specific instruction on how to do (or not to do) something.[18] For example, the trainer might instruct the trainee not to continue to insert the scope when the tip is not advancing. Directive feedback is relevant only to the task at hand and should be given in small bits and immediately applied.

As a trainee's skills mature, facilitative feedback can be more helpful.[19] [20] Facilitative feedback involves discussing performance with a learner in a way that helps her reflect on what happened, analyze her performance, and recognize areas of strength or that need improvement. This enables the learner to problem-solve, which can foster lasting skill development. For example, the trainer might say, "It looks like you're having trouble positioning your polyps. Do you think you tend to have a loop in your scope?" This prompts the fellow to critically consider her performance. She might think about why she's struggling with positioning, what a loop feels

like, and why polypectomy is easier without a loop. Thinking through these questions will help her in future situations, such as the next time she tries to remove a polyp has a loop in the scope.

Facilitative feedback is often offered as delayed feedback. Questions might include, "What did you learn from this case?" or "What do you think went well/poorly?"[21] The trainer can bring up decision points, in order to discuss the trainee's reasoning in those situations.[22] Facilitated feedback can stimulate the trainee to consider multiple forms of feedback received during a training experience (Table 4 shows source examples). The trainee should be empowered to make use of all feedback sources and integrate the information into a more comprehensive view of her strengths and weaknesses.

Phase 4 – Help the learner assimilate the feedback and set goals for the next session

The trainer should ensure that the trainee understands how his performance differs from the standard and what can be improved to bring the performance closer to the standard. The trainee should then make a plan for improvement. This may involve changing a technique, practicing on a simulator, reading about a technique in an endoscopy text, etc. The trainer should demonstrate commitment to helping the trainee improve by planning to re-observe the trainee. Through this process, the trainer and trainee form an "educational alliance,"[23] which creates an environment of trust and mutual respect. The plan for improvement becomes the goal of the next training session, the trainer observes again, and the cycle continues.

Conclusions & suggestions for practice

Returning to our initial example, the trainer and trainee could have made many changes to improve the training experience. Some disappointment could have been avoided by setting an agenda at the beginning of the week.[24] The trainer should have asked the trainee what his goals were, and they should have established the conditions under which she would take over the scope. The trainee probably had cognitive overload during the session, and he may have paid more attention to the trainer's feedback if she had asked him to stop what he was doing. The trainee should have chosen the timing and content for his feedback. Had the trainer known what the trainee was working on, she could have provided more specific feedback, which would have been more motivating. A more facilitative reflection format for the feedback at the end of the week would have helped the trainee consider his strengths and weaknesses, discuss the nontechnical skills that impacted the week, and plan for improvement. Finally, the pair should have set goals for the next training session and made a plan to re-observe.

Figure 1 summarizes the training cycle we propose. By repeating these cycles of goal-directed practice and feedback, we can facilitate development of endoscopists who are well-prepared for independent practice.

Figure and tables

Figure 1 – Practical suggestions for the training cycle

Before the session	During the session	After the session
• Negotiate goals with the trainee • Determine what feedback is requested	• Trainer directs his attention to what the trainee wants observed • Be mindful of cognitive load • Provide brief, directive feedback • Stop procedure when more detailed feedback is needed	• Provide bulk of feedback (both requested and indicated) • Facilitate reflection • Set goals for the next session • Plan to re-observe

Table 1 – Sample agendas

- A novice trainee might aim to insert the colonoscope, with the goal of traversing the sigmoid colon. The trainer will plan to take over after ten minutes, or if the trainee encounters significant difficulty progressing. The trainee will receive feedback on his recognition of the direction of the lumen, safety of technique, and maintenance of a straight scope.
- An experienced trainee might aim to perform the entire colonoscopy independently. The trainer will plan to take over if the trainee fails to progress over a long period of time, the patient becomes unstable, if a technique needs to be demonstrated, or if the procedure takes longer than an agreed-upon time. The trainee will receive feedback on her mucosal exam in the right colon and her hot snare polypectomy technique.

Table 2 – Examples of intrinsic, extraneous and germane load

Intrinsic load	Extraneous load	Germane load

• pre-procedural preparation of patients • controlling the colonoscope and other equipment during the procedure • understanding what one is seeing on the monitor • managing patient comfort • remembering endoscopic findings • completing the report accurately	• distractions (internal or external) • unfamiliar or confusing instructions from the attending • procedural space layout • other people in the endoscopy room	• how to remove an endoscope loop (torque + withdraw slowly + feel tension on scope release) • how to perform a snare polypectomy (position the snare + close snare + deflate + step on pedal + communicate with technician…)
Should be tailored to the learner's abilities	Should be minimized	Where learning occurs; should be maximized

Table 3 – examples of standard terminology that may be used by a training center[25]

Tip up – turn large dial toward endoscopist	Tip down – turn large dial away from endoscopist
Tip left – turn small dial toward endoscopist	Tip right – turn small dial away from endoscopist
Advance – insert scope into the patient	Withdraw – remove scope from the patient
Torque left – apply counterclockwise torque to the insertion tube	Torque right – apply clockwise torque to the insertion tube
Insufflate – occlude the air button to allow gas to flow into the patient	Deflate – depress the suction button to remove gas from the patient
Stop – halt all activity	

Table 4 – Sources of feedback in the endoscopy unit

Source	Example
Trainee sees the effect of his actions on the screen	If a fellow says, "I can't seem to get through the transverse colon. I start moving backward, and then you take the scope away," this could spark a discussion about sigmoid loops and how to recognize and reduce them.
Suggestions received from a nurse	A fellow might say, "the nurse kept asking where I was in the colon. Why can't she just pay attention?" This could provide insight for the trainer into a problem with team

	dynamics. A discussion on team roles and communication might then be helpful.
A patient's report of pain	A trainer might point out, "Several times today, as you were retroflexing in the rectum, your patients appeared uncomfortable. Did you notice that?" This might spark a discussion about communicating with the patient or using other strategies to recognize and minimize patient discomfort.
The trainer's review of a written report	If a trainee is leaving out important details, the trainer might start printing the trainee's version of the note and asking him to compare it to the final version and discuss the differences.
Formal performance data.[14]	Providing cecal intubation rates and adenoma detection rates to fellows can be logistically challenging but can inspire change

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